A FARM BUSINESS STUDY

IN THE BIRTLE-SHOAL LAKE AREA OF MANITOBA

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IN CO-OPERATION WITH
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INTRODUCTION

This study forms part of a larger inquiry into the economic aspects of the organization and management of Manitoba farms in representative type of farming areas on broad and important soil regions. It is the second study made on soils of the Northern Black Earth zone.1/

The general purpose of the study was to obtain information on the land resources and on the problems associated with its use; the more specific objectives may be stated as follows:

1. To find out how the farms are owned and managed and how they are organized, that is how large they are and what crops and livestock are grown;

2. To find out from what sources income is obtained and on what it is spent;

3. To study progress made by the farm operator;

4. To study the degree of efficiency and success attained in the operation of the farm.

The study involved the collection of information relating to utilization of land, sources of receipts, farm expenditures, farm inventories and some information on the personal history of the farm operator and his family.

Farm business records were obtained from 78 farm operators. This represents a 27 per cent sample of the total number of farms in the survey area. The farms were stratified by size of farm, and then selected at random within each size group. An attempt was made to have the number of records obtained in any size group in the same proportion to the total number of farms in that group as that group total was to the total number of farms in the area. However, because of the variation in farms it was necessary to take a larger proportion of records in some groups. This variation was more pronounced among the larger farms.

1/ The first study made in the Northern Black Earth zone was A Farm Business Study in the Hamiota Area of Manitoba, 1948. T.O. Riecken, September 1952. Other studies in this series are (1) Farm Business in the Gilbert Plains and Sifton Areas of Manitoba, 1949, by J.G. MacKenzie, January 1953. (2) Farming in the Armstrong District of Manitoba, 1948, March 1953, by T.O. Riecken, and (3) Farming on Almassippi Soils of Central Manitoba, by J.P. Hudson, December 1953. All of these studies were made by the Economics Division, Canada Department of Agriculture, Winnipeg, in co-operation with the Department of Political Economy, University of Manitoba.

The number of additional records required was determined by the application of a variance test to the records obtained at a point about halfway through the survey.

The growing season for the area in 1949 could be considered somewhat more favourable than usual. The precipitation was slightly above the long-time average. The average long-time yield per acre of wheat, barley and oats for the shipping point of Shoal Lake was 19.8 bushels, 22.9 bushels and 33.8 bushels respectively.1/ The average yield per acre in 1949 for the farms included in the survey was 22.3 bushels for wheat, 30.5 bushels for barley and 41.4 bushels for oats.

GENERAL CHARACTERISTICS OF THE AREA

Location

The area covered by the survey is an irregularly shaped block of land, between the towns of Shoal Lake and Birtle in western Manitoba. It is partly in each of the rural Municipalities of Birtle and Shoal Lake. The Edmonton branch line of the Canadian Pacific Railway passes through the area. The town of Brandon is about 60 miles to the southeast. The survey area contains about 142,000 acres, a little more than six townships of land. (Figure 1 shows the survey area).

Climate

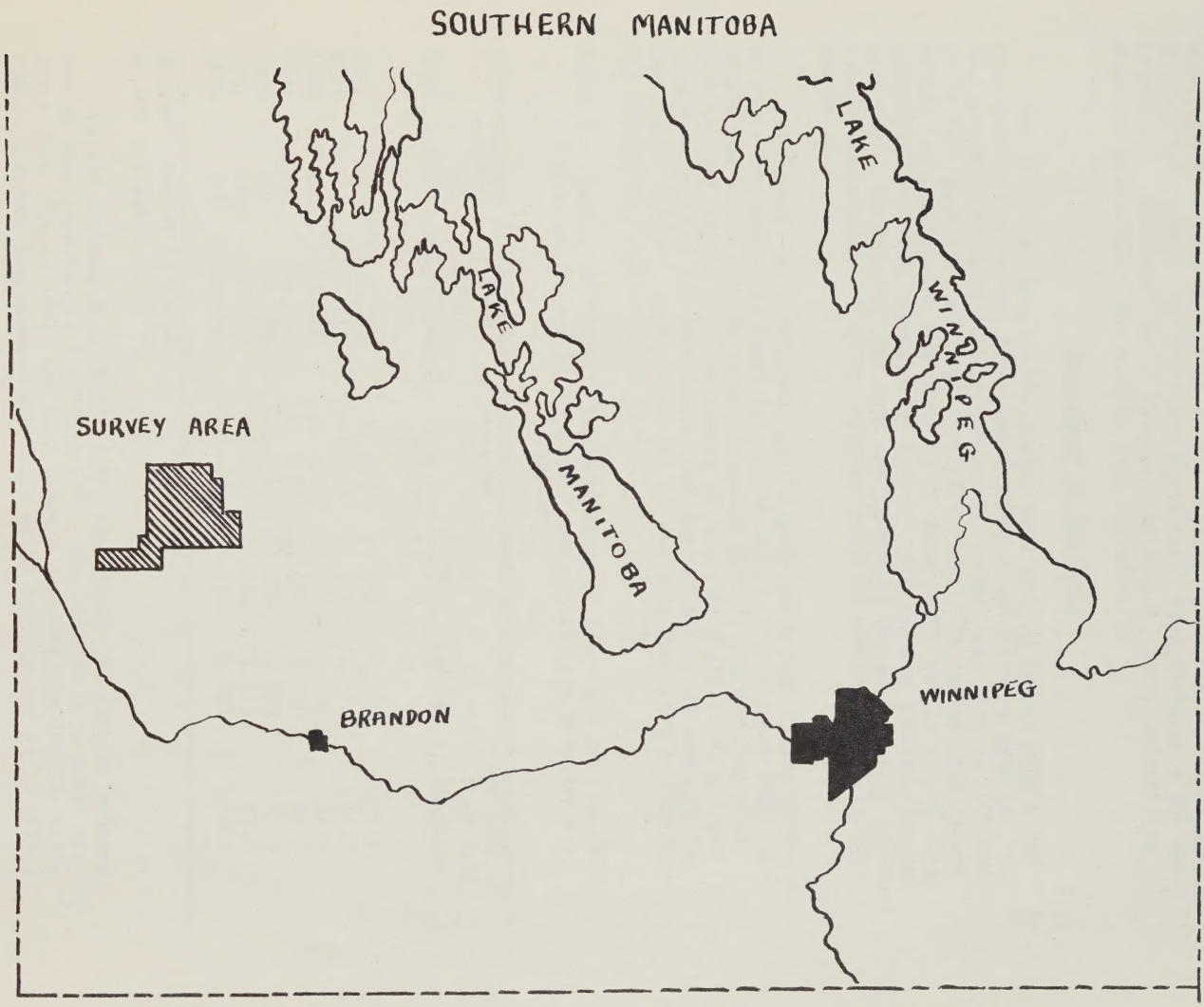
Climatically the area is suitable for the production of the common cereal and forage crops grown in Manitoba; also every kind of commercial livestock produced within the province is produced here. The frost-free period is about 110 to 115 days, which is about 15 to 20 days less than the frost-free period of southern Manitoba, but about ten days longer than the frost-free period in the most northerly agricultural area of the province.

The annual precipitation in the area is 16 to 17 inches. On the average about half the precipitation falls in the growing season from April to July and another 4.5 inches falls in the months of August, September and October.

Soils and Other Physical Factors

The soils of the area are northern black earths of the Newdale association. The soils are fertile and of clay loam texture. They are described as follows: northern black earth soils developed on glacial till, under intermixed prairie and aspen woods, with local areas of poorly drained calcareous and saline soils. Topography: undulating with occasional to numerous sloughs and undrained depressions.

1/ Information provided by C.C. Chappell, Provincial Municipal Assessor, Province of Manitoba, for the period 1926-46 inclusive.


SOUTHERN MANITOBA
LAKE
WINNIPEG
LAKE
MANITOBA
SURVEY AREA
BRANDON
WINNIPEG

Agricultural value: generally good. Especially suited to coarse grains, grasses and legumes and livestock production, also favourable for wheat production. Problems: water erosion from knolls, local infertility problems where soils are more or less degraded."1/

Settlement of the Area

The first settlers in the survey area arrived in the 1870's and came mainly from Bruce, Huron and Wellington counties in Ontario. The Manitoba Northwestern Railway was built through this area in 1885 and after that date the area was settled rapidly. The survey area is not wholly included in the municipality of Shoal Lake, nor is all of this municipality in the survey area; however, the two are similar, for the most part. Development and land use trends in the municipality of Shoal Lake would probably be quite representative of similar trends in the survey area.

Settlement and development of the area had become fairly stable by 1921. The number of farms has varied only a little since 1921, although the total area in farms increased about eight per cent from 1921 to 1941 (Table 1). The number of acres in field crops has declined nearly ten per cent since 1926 and the amount of summerfallow has almost doubled. The proportion of the farm land that is improved has increased slightly since 1916.

Table 1.- Number of Farms, Total and Improved Area, and Area in Field Crops and Fallow of Occupied Farms, Shoal Lake Municipality, 1921-1946

Year	Number of farms	Total area in farms	Improved area	Field crops	Fallow	Per cent of farm land improved
			- acres -			
1916	234	116,313	55,265	37,864	a/	47.5
1921	321	129,415	61,787	43,960	16,874	47.7
1926	332	131,110	62,820	47,714	14,146	47.9
1931	325	134,336	61,743	41,003	19,480	45.7
1936	327	133,483	62,246	41,400	19,065	46.6
1941	288	140,168	66,988	38,576	27,415	47.8
1946	300	136,595	66,181	40,197	25,131	48.4

Source: Census of Canada.
a/ Not available for 1916.

Cattle numbers show considerable variation, the largest numbers having been reported in 1936 (Table 2). Hog numbers were quite constant from 1926 to 1941, but have shown a considerable decline since 1941. However, hog numbers fluctuate quite rapidly and it is likely

1/ Land Classification Map, Rossburn Area of Manitoba, Manitoba Soil Survey, University of Manitoba, 1940.

that the number of hogs at some times may have been much higher or lower than the information for the census year indicates. In fact the number of hogs at some time between 1941 and 1946 may have greatly exceeded the number reported in those two years. Sheep are unimportant in this area and have shown a gradual decline in numbers since 1931. The horse population, as elsewhere, has declined in recent years. (Table 2).

Table 2.- Livestock Population, Municipality of Shoal Lake, 1916-1946

Year	Horses	Cattle	Swine	Sheep
1916	3,076	4,413	1,074	363
1921 a/	-	-	-	-
1926 a/	-	-	-	-
1931	2,644	4,737	1,927	815
1936	2,486	5,753	1,701	689
1941	2,375	4,850	1,879	434
1946	1,708	5,601	1,487	427

Source: Census of Canada.
a/ Information not available.

Size of Farm and Tenure

During the course of the survey the name of the owner and occupant of each parcel of land was obtained. This made it possible to obtain the total number of farms in the area, and to classify each farm according to size and type of tenure (Table 3). A feature of land ownership in this area is that most of the land is operated by people who own it, and a higher proportion of the farms are relatively small. A little more than 90 per cent of the land is owned by private individuals, most of whom live in the area and farm the land they own. Corporate organizations, including loan and mortgage companies, own 8.4 per cent of the land, and provincial and municipal governments own 1.2 per cent.

Table 3.- Number and Tenure of Farms, According to Size of Farm, Birtle-Shoal Lake Area, 1950

Number of quarter-sections	Number of farms	Types of tenure		
		Owners	Part-owners	Renters
One	40	36	-	4
Two	110	101	8	1
Three	66	50	14	2
Four	43	34	7	2
Five and more	35	18	13	4
All sizes	294	239	42	13

The size of farm is measured in quarter-sections. The quarter-section, 160 acres more or less, is the unit of land survey in western Canada. Land is usually acquired in quarter-section units or multiples of quarter-sections; very seldom are parcels of land much smaller than a quarter-section bought and sold. The significant feature of the information on size of farms is that after 75 years of settlement more than half of the farms are still of one and two quarter-sections in size.

The type of farm tenure in the area was broken down into three groups: owners, part-owners, and tenants. Owner-operators, who owned all the land they operated, made up more than four-fifths of all farms of the survey area. Part-owners, who owned part and rented part of the land they operated made up nearly 15 per cent of all farms. Tenants, who rented all the land they operated made up the remainder. In general, although the high proportion of owners reflects the progress made toward full ownership of land, these proportions are only significant when related to the sizes of the farms concerned. Because a high proportion of the owned land is operated by the owners, the opportunities of increasing the size of the farm by renting or buying land, are limited.

Nearly 75 per cent of the present operators bought their first parcel of land, nine per cent received it as a legacy and 18 per cent rented their first land. Half of the farmers made at least one addition, averaging 181 acres, to their original holding, on the average nearly five years after acquiring their first parcel; less than ten per cent made a second or third addition. The average size of the original holding was 266 acres and was acquired mostly as half section units.

Net Worth of the Present Operators

The net worth indicates the net investment of the farm operator in his farm lands and other forms of farm capital. A study of the net worth is significant because it indicates the savings the operator has made from the operation of his farm and also indicates the operator's experience in saving from farm earnings. Generally the net worth position is closely related to size of farm and tenure. Table 4 shows the assets and net worth for the farms of the survey area according to size of farm. Farm real estate made up the greatest amount of the farm assets on all sizes of farms, and machinery and equipment was the second largest item. "Other assets" which include such things as bonds, bank accounts, accounts receivable, household goods and other property not part of the farm, were fairly significant and made up about 17 per cent of the total assets on all farms.

Distribution of the assets according to types of tenure indicated the owners had a net worth of $18,754, part-owners $19,663, and tenants $7,387. Liabilities were $2,177 for the owners, $3,364 for the part-owners, and $504 for the tenants. Farm real estate made up about 49 per cent of the owners' total assets and 41 per cent of those of the part-owners . Part-owners had the largest investment in equipment and livestock. The renters generally had much smaller amounts invested in each of the forms of assets than the owners and part-owners did.

Table 4.- Net Worth of Farm Operators, According to Size of Farms, 78 Farms, Birtle-Shoal Lake Area, 1950

	Number of quarter-sections			
	One and two	Three and four	Five and more	All farms
	- average dollars per farm -			
Assets				
Real estate	5,398	9,340	15,819	9,001
Livestock	1,810	3,294	3,678	2,745
Machinery	2,476	5,090	7,159	4,409
Seed, feed, and supplies	300	551	1,305	600
Other assets	2,556	4,025	4,141	3,427
Total assets	12,540	22,300	32,102	20,182
Liabilities	1,084	3,236	3,404	2,360
Net worth	11,456	19,064	28,698	17,822
Number of farms	33	29	16	78

The farmers from whom records were obtained had been on their present farms for an average of about 11 years which is a relatively short time; the length of occupancy, however, ranged from one to 41 years. Operators on farms of a section or less had been on their farms for a little more than ten years on the average; those on farms of more than a section had been there for nearly 14 years. These operators started on their present farms with fairly substantial amounts of capital. Those at present on farms of one and two quarter-sections had an average of about $3,200, and those presently on farms larger than one half section averaged about $5,300 when they started.

Average annual changes in net worth have been used as a measure of the success an operator has achieved in his farming operations. However, in using this indicator, due weight must be given to the level of prosperity which prevailed during the period under consideration. Table 5 shows the financial progress of the operator according to the length of time he had operated his farm. Those farmers who started farming within the last few years have made much larger gains than those who started earlier. In general, the longer the period of operation the smaller the annual gain.

Table 5.- Average Annual Change in Net Worth, 78 Farms, Birtle-Shoal Lake Area, 1950

Number of years on farm	Changes in net worth per year	
	Farm activity	All activities
	- average dollars per farm -	
1 - 4	2,160	2,357
5 - 10	1,751	1,839
11- 15	1,600	1,654
16- 25	1,378	1,441
More than 25	563	628

More than half of the land is unimproved --
and some of it is waste.

The relatively large average annual gains of the farms who started to farm in the past few years reflects the good yields and prices that prevailed in these years. However, there can be little doubt that part of the gain in net worth has been the result of an increase in price levels, although an attempt was made when valuing the assets to assign conservative values to them. The smaller gains in the longer periods of operation reflect the depressed conditions of the 1930's.

Liabilities.- Nearly three-quarters of the 78 farms visited reported some debt, averaging $2,902 per farm for the 57 farms' debts (Table 6). Land indebtedness was reported by 55 per cent of the farms. A little more than one-quarter of the operators owed money on their equipment and machinery. Forty-five per cent of the farms used bank or other loan sources to obtain credit. According to types of tenure the part-owners had the largest debts. Almost 30 per cent of the owners, 25 per cent of the part-owners, and almost 40 per cent of the tenants had no debts.

Table 6.- Liabilities According to Types of Tenure on 57 Farms Reporting Liabilities, Birtle-Shoal Lake Area, 1950

	Types of tenure							
	Owners		Part-owners		Tenants		All farms	
	Farms reporting this debt	Average of farms reporting	Farms reporting this debt	Average of farms reporting	Farms reporting this debt	Average of farms reporting	Farms reporting this debt	Average of farms reporting
	No.	$	No.	$	No.	$	No.	$
Agreement for sale	22	3,042	10	2,677	-	-	32	2,928
Mortgages	7	1,795	4	2,208	-	-	11	1,945
Machinery and equipment	14	595	5	816	2	790	21	631
Bank loans	7	929	9	836	-	-	16	888
Other loans a/	12	1,050	5	1,067	2	762	19	944
Doctor	6	123	-	-	-	-	6	123
Operational b/	3	500	1	60	2	468	6	416
All farms reporting liabilities	36	3,022	16	3,287	5	808	57	2,902

a/ Includes loans on life insurance, chattel mortgages and credit union loans.
b/ Includes indebtedness on garage, gas and oil, taxes, rent, feed and seed accounts.

FARM ORGANIZATION

The most common type of farm organization was the general type of farm, with production of cereal crops the most important enterprise and beef cattle the main livestock enterprise. Most of the operators grew wheat, oats

and barley although some of them did not have all three of these crops. Crops other than wheat, oats and barley were not important. Livestock were kept on most of the farms, sometimes in numbers sufficient only to satisfy family needs; other farms kept fairly large herds of cattle that provided a fair amount of income.

Land Use

The farms of the Birtle-Shoal Lake area are located on fairly fertile soils and in a good crop district but a large proportion of the total farm area is not suitable for crop production. Large sloughs and poorly drained areas are a dominant feature of the topography and have influenced the amount of land that is arable. The average size of the 78 farms visited was 486 acres of which 226 acres, less than half, were cultivated (Table 7). Of the 255 acres of unimproved land 219 acres were grass and hay sloughs, the remainder being woodland or waste that provided very little grazing. Wheat, the most important crop, occupied almost one-quarter of the cropland and was followed by oats in order of importance although barley was only slightly less important. More than 40 per cent of the cropland was in summerfallow. The acreage in grasses and legumes for seed, hay, and pasture was not large and occupied slightly more than two per cent of the cropland. Other crops, including rye and flax were not important.

There was some variation in the patterns of land use between farms of different sizes. Wheat occupied nearly 21 per cent of the cropland on the farms larger than a section and nearly 24 per cent of farms of one and two quarter-sections. The same trend was apparent in the oats acreage but the proportion of cropland in barley was 18 per cent on the largest farms and 14 per cent on the smallest farms; on farms of more than a section in size there were more acres of barley than there were acres of oats.

Table 7.- Utilization of Land, 78 Farms in the Birtle-Shoal Lake Area, 1949

Use	Average acres per farm	Per cent of cropland	Per cent of total assessed acres
Wheat	51	22.6	
Oats	39	17.3	
Barley	34	15.0	
Rye and flax	2	.9	
Grasses and legumes	5	2.2	
Summerfallow	91	40.2	
New breaking	4	1.8	
Total cropland	226	100.0	46.5
Acres in farmstead	5	-	1.0
Total unimproved acres	255	-	52.5
Total assessed acres	486	-	100.0

Although wheat, oats, and barley are probably equally adaptable to the climatic and soil conditions prevailing in the survey area it was observed that the farms visited placed different emphasis on the amounts of wheat, oats and barley in their cropping patterns. For instance, 90 per cent of all farms visited grew wheat - farms over a section in size produced wheat, but only 82 per cent of the one and two quarter-section farms grew it. On the farms growing wheat from two to 76 per cent of the cropland was in wheat. Ninety-two per cent of the farms visited grew oats and the average sown to this crop ranged from two to 44 per cent of the cropland. Eighty-six per cent of the farms grew barley: all farms larger than a section, but only two-thirds of the farms of a half-section or less grew barley. Generally, there was a tendency for the larger farms to have some of their cropland seeded to each of these grains and in proportions less variable than on the smaller farms.

The most outstanding feature of the land use pattern was the relatively high proportion of summerfallow acreage. Summerfallow is used to accumulate moisture or to clean weeds from the land, but in the survey area moisture is not too limiting a factor. However, cropping practices may be influenced by temporary climatic conditions and price changes relative to change of prices for competing crops; cropping practices also change with technical changes or innovations related to raising crops. Thus to indicate a more typical use of land it would be desirable to show the use of land over a longer period. Table 8 presents data on the use of the cropland in Shoal Lake municipality for the census years 1936, 1941 and 1946. In 1936 rust resistant wheat was not in widespread use and coarse grains were more suitable in this area. Summerfallow occupied nearly one-third of the cultivated land indicating a fairly close adherence to a three-year cropping rotation. In 1941 and 1946 wheat was more important. The proportion of summerfallow had increased considerably and was about the same as shown in the present study. The high proportion of summerfallow reflects the tendency to follow a rotation that provides land more likely to produce a good crop of grain for cash sale, and at the same time control weeds and also permit more even use of labour by reducing peak loads at seeding and harvest times and increasing labour use during the summerfallowing period.

Table 8.- Use of Cultivated Land in Shoal Lake Municipality, 1936, 1941 and 1946

Use	Average acres per farm			Per cent of cultivated acres		
	1936	1941	1946	1936	1941	1946
Wheat	36	61	53	19.0	26.3	24.0
Oats	51	44	37	27.0	19.0	16.7
Barley	36	22	40	19.0	9.5	18.1
Rye and flax	-	4	2	-	1.7	.9
Cultivated hay and pasture	5	4	4	2.7	1.7	1.8
Other	3	2	1	1.6	0.9	.5
Summerfallow	58	95	84	30.7	40.9	38.0
Total cultivated	189	232	221	100.0	100.0	100.0

Source: Census of Canada.

Livestock

All of the farms kept some livestock, although two of them kept only horses. There were cattle on 92 per cent of the farms and hogs on 76 per cent. Sheep were kept on only six farms. Three-quarters of the farms kept some chickens; ducks, geese, and turkeys were kept on only a few farms.

To determine the relative importance of each class of livestock it is desirable to use a common measure for the different classes and ages of livestock, the "animal unit" 1/ measure is the one used here. All livestock other than horses are described as "productive animal units".

Cattle are the most important class of livestock and on the average make up nearly 80 per cent of the productive livestock on all sizes of farms (Table 9). The size of the cattle enterprise increased with increases in the size of farm, but there was not much variation on farms larger than one and two quarters. The cattle herd was managed mostly as a beef cattle enterprise, the operators selling live cattle and some cream, but a few farms sold considerable amounts of milk and cream. The size of the cattle enterprise, measured in number of cows, varied from one to 21 cows. Nearly 40 per cent of the farms had herds of four cows or less, 41 per cent had between five and ten cows, and one-fifth had more than ten. Between the beginning and end of the survey year there was an increase of nearly seven per cent in the numbers of cows, heifers and calves. Cattle, managed for the most part as grazing animals, can utilize land unsuitable for crops. There was some tendency for the number of cattle on farms to increase as the amount of unimproved land on the farms increased.

Table 9.- Animal Units of Various Classes of Livestock According to Size of Farm, 78 Farms, Birtle-Shoal Lake Area, 1949-50

Classes of livestock	Number of quarter-sections: One and two	Three and four	Five and more	All farms
	- average animal units per farm -			
Cattle	8.8	15.1	16.3	12.7
Hogs	.7	1.0	1.6	1.0
Sheep	.1	.2	-	.1
Poultry	.4	.5	.5	.5
Total productive animal units	10.0	16.8	18.4	14.3
Horses	4.2	4.7	4.0	4.3
Number of farms	33	29	16	78

1/ An animal unit represents an average mature horse, cow or the equivalent in other livestock from the standpoint of feed consumed and manure produced. The animal unit equivalents of other livestock are: 1.4 steers or heifers, three calves, three sows or five other market weight hogs, seven ewes or 14 market weight lambs and 100 mature poultry.

Cattle enterprises are important.

At the beginning of the year only a little more than 40 per cent of the farms had any sows, but by the end of the year 55 per cent of the farms were keeping them. Most of the farms with sows had only one. Nearly one-third of the farms bought some hogs, most of them weanlings to provide meat. Forty-nine farms sold an average of 6.7 hogs per farm.

Large poultry enterprises were not common; there were only ten laying flocks of 75 or more hens and only four of 150 or more. The most common size of flocks was between 40 and 70 hens. The prevailing practice for flock replacement was to buy hatchery chicks each year; 60 per cent of the farms bought an average of 130 chicks. Losses of chickens were quite high, averaging 45 per farm.

Horses were becoming less important as a source of power, but there were still a considerable number of horses on the farms. At the beginning of the year almost one-third of the farms had less than four horses per farm, 56 per cent had from four to six horses and the remainder had more than six horses. Although most farms used tractors, some farmers still used horses for some field work and during harvesting and haying.

Labour

The labour used on the farms of the survey has been broken down into three groups according to the type of worker, as follows: the operator, unpaid family labour, which includes family members other than the operator who received no stipulated wage for their labour, and hired labour (Table 10). The operators supplied 70 per cent of the labour, unpaid family labour supplied about 18 per cent, and hired labour supplied 12 per cent of the labour used on the 78 farms of the survey. Family members other than the operator did some of the farm work on nearly half of the farms. Farms hiring labour by the day employed it for about 11 man-days on farms of one and two quarter-sections, for about 19 man-days on three and four quarter-section farms, and 24 man-days on farms of five or more quarter-sections. Only five of the 78 farms reported labour hired on a yearly basis.

The total amount of labour required varied directly with the size of the farm, ranging from an average of 1.14 man equivalents 1/ on the farms of one and two quarter-sections to an average of 1.90 man equivalents on farms larger than a section. More than half of the farms employed from 1.00 to 1.25 man equivalents. A little more than one-fifth of the farms employed the equivalent of two or more and most of these farms were three quarter sections or larger.

The type of farm also influenced the amount of labour required. On farms of the same acreage, there were more man equivalents on farms with larger cattle enterprises (Table 11). Although farms with the larger cattle enterprises had more cropland acres the larger labour forces were probably required more to handle the cattle than the additional cropland acreage.

1/ A man equivalent is the equivalent of one man working full time on the farm throughout the year.

Table 10.- Farm Labour Supply According to Source and Size of Farm, 78 Farms, Birtle-Shoal Lake Area, 1949-50

Source of labour	Number of quarter-sections: One and two	Three and four	Five and more	All farms
	- average months per farm -			
Hired: By the year	-	.41	3.00	.77
By the month	.06	.69	2.66	.82
By the day	.26	.55	.64	.45
All hired labour	.32	1.65	6.30	2.04
Unpaid family labour	1.32	4.41	4.53	3.13
Operator	12.00	12.00	12.00	12.00
All labour	13.64	18.06	22.83	17.17
Number of farms	33	29	16	78

Table 11.- Man Equivalents According to Size and Type of Farm, 78 Farms, Birtle-Shoal Lake Area, 1949-50

Size and type of farm	Number of farms	Man equivalents	Animal units of cattle	Acres of cropland
	- average number per farm -			
One and two quarter-sections				
8 and less cattle animal units	16	1.08	3.5	104
9 and more cattle animal units	17	1.19	13.8	129
Three and four quarter-sections				
15 and less cattle animal units	17	1.39	9.2	244
16 and more cattle animal units	12	1.67	23.4	279
Five and more quarter-sections				
15 and less cattle animal units	9	1.64	7.5	388
16 and more cattle animal units	7	2.24	27.6	403

Farm Capital

The total average farm capital of the operator was nearly $16,000 and ranged from $1,105 on a one quarter-section rented farm to $37,314 on a five quarter-section farm. The average investment in farm real estate, which includes land and buildings was $8,792 per farm or about $18 per acre. Investment in machinery was $3,964 per farm or nearly $18 per acre of cropland. Machinery investment ranged from $284 on a one quarter-section farm to $12,346 on a highly mechanized farm. Investment in livestock averaged $2,556 per farm and ranged from $32 on a farm with horses only to $7,863 on a farm with a large cattle enterprise.

Farm Capital and Size of Farm.- The average investment in real estate per farm on the three and four quarter-section farms was about double the real estate investment on the one and two quarter-section farms, (Table 12) and the real estate investment of the farms larger than four quarter-sections was about three times the average investment on the smallest farms. On a per acre basis the average real estate investment was, one and two quarter-section farms $21, three and four quarter-section farms $16, five and more quarter-sections $18. Machinery investment per farm showed the same tendency to increase in proportion to size of farm as real estate investment did. Investment in livestock and feeds, seed and supplies varied with the type of farm and was not uniformly associated with increases in the farm acreage.

The proportion of real estate to total capital was lowest on the medium-sized farms and highest on the large farms. The proportion of investment in machinery was about the same on all sizes of farms. The proportion of investment in livestock decreased as size of farm increased. The relatively higher proportion of total capital in feeds, seeds and supplies on the largest farms, indicates higher inventories of grain on these farms.

Table 12.- Average Farm Capital According to Acreage, 78 Farms, Birtle-Shoal Lake Area, 1949-50

Capital investment	Number of quarter-sections: One and two	Three and four	Five and more	All farms
	- average dollars per farm -			
Real estate	5,221	9,171	15,469	8,792
Machinery	2,222	4,633	6,345	3,964
Livestock	1,749	3,005	3,409	2,556
Seed, feed and supplies	288	552	1,250	584
Total	9,480	17,361	26,473	15,896
Number of farms	33	29	16	78

Farm Capital and Tenure.- The part-owner farms had the largest total farm capital, but they were the largest farms, averaging 641 total acres, compared with 438 acres for the owners and 401 acres for the renters. The tenants had the lowest total farm capital and also the lowest amount of capital of each type (Table 13). The low livestock investments of the tenants probably reflects the unstable nature of their tenure and unsuitable accomodation for livestock, in addition to a shorter length of tenure.

Tables 12 and 13 suggest that farms generally require large outlays of capital to be adequate in size and equipment supplies. The major part of the capital was for land and buildings and machinery. The large outlay

necessary to provide suitable and sufficient machinery to plant and harvest the crops at the optimum times makes it necessary to have fairly large acreages if the overhead costs of the machinery are to be kept at a reasonable level. Where capital for purchase of land is limited, it is often the practice to rent land. The part-owners have the largest farms and the lowest machinery investment per acre of cropland. Livestock capital also is a significant part of the total investment. Livestock capital can be built up through the "natural" increase characteristic of livestock production. But if the livestock enterprises are also to provide some current revenue during the building-up stage, the accumulation of livestock capital is likely to be slow, and is not likely to provide much capital for acquiring land or equipment. The relatively slow "natural" growth of livestock capital plus the difficulty of establishing livestock enterprises under tenure conditions of short and insecure leases, point up the difficulties that operators of small or rented farms often encounter in securing sufficient capital to develop a good farm unit.

Table 13.- Average Farm Capital According to Types of Tenure, 78 Farms, Birtle-Shoal Lake Area, 1949-50

Capital investment	Types of tenure		
	Owners	Part-owners	Renters
	- average dollars per farm -		
Real estate	10,047	9,151	49
Machinery	3,801	4,653	3,266
Livestock	2,399	3,441	1,326
Seed, feeds and supplies	612	602	360
Total	16,859	17,847	5,001
Number of farms	50	20	8

Machinery and Equipment.- The average investment in machinery was $19 per acre of cropland on farms of one and two quarter-sections, $18 per acre of cropland on the three and four quarter-section farms, and $16 per acre on farms of five or more quarter sections. Tractors provided practically all of the power for field operations, there being only five farms without tractors. A little more than 75 per cent of the farms had one tractor per farm, 12 per cent of the farms had two tractors per farm, and nearly five per cent had a half or third share in a tractor.

The most common method of harvesting was to cut grain with a binder and thresh the grain with a separator. Only 15 of the farms in the survey had combines, and more than half of them were on the largest farms. The small acreages make it difficult to support the relatively high investment in a combine. The large numbers of livestock on some farms make it necessary for most farms to save the straw for feed and bedding.

Nearly three-quarters of the farms reported having a car and nearly one-third reported having a truck; 12 per cent of the farms had neither a car nor a truck.

Farm Buildings.- Farm buildings were relatively modest on the farms of the survey. The average investment in buildings was nearly $4,000 per farm; the farm house made up a little more than half of the value of all buildings, barns and other buildings used for livestock made up nearly one-third of the investment, granaries for storage of grain, seed and feed made up about 12 per cent, and buildings used for storing and repairing machinery made up a little more than five per cent of the building investment. The investment in buildings was $10.76 per acre on the one and two quarter-section farms, $7.73 per acre on the three and four quarter-section farms and $6.78 on farms of five or more quarter-sections.

The investment in livestock buildings was larger within each size of farm group on the farms with cattle herds larger than average for the size group. However, the investment in livestock buildings per animal unit was considerably less on the farms with the most livestock. The investments in livestock buildings per animal unit were as follows:

farms of one and two quarter-sections:
8 and less cattle animal units - $114 per animal unit
9 and more cattle animal units - $ 66 per animal unit

farms of three and four quarter-sections:
15 and less cattle animal units - $91 per animal unit
16 and more cattle animal units - $77 per animal unit

farms of five and more quarter-sections:
15 and less cattle animal units - $170 per animal unit
16 and more cattle animal units - $ 65 per animal unit

Receipts

The farmer's income is received from two main sources, farm production and non-farm sources. The income from farm production may be in the form of cash received from sale of produce, in the form of farm perquisites, or an increase in inventory resulting from increased values and production of livestock and increased holdings or carryovers of grain and supplies on the farm.

Crop sales made up nearly two-thirds of the total cash receipts for all farms, and receipts were about evenly divided between wheat and other crops (Table 14). Other crops were almost entirely oats and barley. Cattle sales made up most of the receipts from livestock; receipts from all classes of livestock and sales of livestock produce made up about 25 per cent of the total revenue. Sales of previous year's crops were not important. Other farm receipts made up about nine per cent, but receipts from custom work were the most important item included in the other farm receipts and averaged about $95 per farm.

Increases in inventory were considerable, averaging more than $2,100 per farm. Most of the increases in inventory were increases resulting from machinery and equipment purchases and increased carryovers of grains and larger livestock herds. Farms that had more than average numbers of livestock had considerably larger inventory increases than those with less than average livestock.

Non-farm income averaged $508 per farm. Pensions and family and dependents' allowances averaged $96 per farm. Payments on participation certificats for crops sold in previous years and prior to the year of the survey were received during the year of the survey. On farms of one and two quarter-sections participation certificate payments averaged $121, on three and four quarter-section farms they averaged $178, and $309 on farms of five or more quarter-sections. Other non-farm income averaged $231 per farm and came from such sources as boarding teachers, co-operative dividends, bond interest, legacies and gifts.

Perquisites include the farm produce consumed in the home and the rental value assigned to the housing provided by the farm house. The farm produce consumed was about the same on all sizes of farms and the amount consumed depends a great deal on the size of the farm family.

Table 14.- Sources and Amounts of Receipts According to Size of Farm, 78 Farms, Birtle-Shoal Lake Area, 1949-50

Source	Number of quarter-sections: One and two	Three and four	Five and more	All farms
	- average dollars per farm -			
Wheat	814	1,811	2,412	1,513
Other crops	698	1,471	3,408	1,541
Cattle	514	686	1,059	690
Other livestock	128	164	254	167
Other farm produce a/	341	297	402	337
Previous year's crop	33	121	137	87
Other farm receipts b/	184	653	489	421
Total cash farm receipts	2,712	5,203	8,161	4,756
Increase in inventory	1,279	2,279	3,486	2,103
Receipts from non-farm sources	451	509	622	508
Perquisites	446	632	726	573
	- per cent of total cash farm receipts -			
Wheat	30.0	34.8	29.5	31.8
Other crops	25.7	28.3	41.8	32.4
Cattle	19.0	13.2	13.0	14.5
Other livestock	4.7	3.2	3.1	3.5
Other farm produce	12.6	5.7	4.9	7.1
Previous year's crop	1.2	2.3	1.7	1.8
Other farm receipts	6.8	12.5	6.0	8.9
Total cash farm receipts	100.0	100.0	100.0	100.0
Number of farms	33	29	16	78

a/ Mostly livestock produce, cream and eggs, but includes small amounts of garden produce and cordwood.

b/ Includes sale of machinery, custom work and off farm labour.

Expenses

Two classes of expenditures are incurred in the operation of a farm, one is for current expenses and the other is for capital account. Current farm operating expenses may be divided into two sub-classes, cash and non-cash. Cash outlay is incurred for such items as taxes, repairs to real estate, seed, fertilizer, gasoline, oil, machinery repairs and labour. Non-cash costs include items such as unpaid family labour. Although unpaid family labour does not receive a stated wage it is considered a legitimate charge against the farm. If it were not available it would have to be hired; it is valued at the same rate at which hired labour is paid.

Table 15.- Average Farm Expenses, According to Size of Farm, 78 Farms, Birtle-Shoal Lake Area, 1949-50

Items of expense	Number of quarter-sections: One and two	Three and four	Five and more	All farms
	- average dollars per farm -			
Taxes on real estate	109	201	281	179
Other real estate a/	79	161	207	136
Crop b/	94	144	333	161
Livestock c/	73	33	48	53
Equipment d/	503	903	1,332	822
Custom work e/	137	123	159	136
Labour f/	77	270	655	267
Other g/	14	14	29	17
Total current cash expenses	1,086	1,849	3,044	1,771
Unpaid labour h/	109	322	340	236
Total current expenses	1,195	2,171	3,384	2,007
Capital expenditures	1,397	2,627	3,888	2,365
Decrease in inventory	271	448	512	386
	- per cent of total current expenses -			
Taxes on real estate	9.1	9.3	8.3	8.9
Other real estate	6.6	7.4	6.1	6.8
Crop	7.9	6.6	9.8	8.0
Livestock	6.1	1.5	1.4	2.6
Equipment	42.1	41.6	39.4	41.0
Custom work	11.5	5.7	4.7	6.8
Labour	6.4	12.5	19.4	13.3
Other	1.2	.6	.9	.8
Total current cash expenses	90.9	85.2	90.0	88.2
Unpaid labour	9.1	14.8	10.0	11.8
Total current expenses	100.0	100.0	100.0	100.0
Number of farms	33	29	16	78

a/ Includes repair to improvements and fire insurance.
b/ Includes seed treatment, seed cleaning, fertilizer, hail insurance, seed, herbicides.
c/ Includes pasture costs, hay leases, feed purchases, breeding fees, veterinary service, salts, sprays.
d/ Includes gas, oil, grease, repairs for all equipment, blacksmith, twine, hardware, motor licenses and insurance.
e/ Includes rent of machinery, custom work and board of crew.
f/ Includes wages of paid hired labour and board of hired and unpaid labour.
g/ Includes telephone, cash rent, and any other expenses.
h/ Includes wages only.

The largest item of expense on all sizes of farms was for the operation and repair of machinery and equipment, averaging just over 40 per cent of the current expenses for all farms (Table 15). If the cost of hiring custom work, which is mostly work of cultivating land, harvesting, and hauling grain, is considered along with the cost of equipment operation, the amount expended for the purpose of seeding, working land and harvesting exceeds half of the farm expenses on the small farms and approaches half of the total current expenses on the other farms. Taxes average about nine per cent on all sizes of farms. Real estate upkeep and crop expenses increase in proportion to the sizes of farm. Livestock expenses are most important on the small farms; most of the cost of livestock enterprises is for feed and most farms use home-grown feeds. Hired labour costs increased as size of farm increased, and made up nearly one-fifth of the total costs on the largest farms. Unpaid labour was more constant but made up a higher proportion of the total costs on the medium size farms than on the small and large farms.

Capital Expenditures.- Expenditures on capital account include purchases of machinery and equipment, livestock, clearing and breaking land, and other more or less permanent improvements made to land and buildings during the year. Depreciation on machinery and buildings is allowed at established rates and is accounted for in the decrease of inventory, which also includes decreases in value of livestock and seeds, feed and supplies on hand. Decreases in inventory were not large on any of the farms.

Capital expenditures for additions to investments made during the year were large and averaged nearly $2,400 per farm. Although capital expenditures represent additions to investments and to a certain extent may be considered as savings, the large amounts of expenditures for relatively short-term working capital such as machinery and equipment indicate that large amounts of money must be spent annually in addition to current expenses if the operator wishes to maintain his farm at an efficient level. On all three size groups the amounts spent for capital were greater than the amounts spent for current expenses.

Nearly $1,600 per farm, two-thirds of the total capital expenditures, was spent to acquire machinery and equipment, and averaged $828 per farm on farms of one and two quarter-sections, and $2,795 per farm on farms of five quarter-sections or more. The amounts spent for equipment were about evenly divided among tractors, harvesting equipment, and cars and trucks, the average amounts being $403, $510, $402 per farm, respectively for these items. An average of $215 per farm was spent for tillage and seeding equipment. Expenditures for new buildings and other improvements to real estate averaged $513 per farm and was about the same on all sizes of farms.

Typical landscapes -- the irregular fields
make field operations difficult.

Measuring Farm Success

A farm may be considered successful if it: (1) pays all expenditures incurred in its operation; (2) pays the prevailing rate of interest on all capital invested in the farm (3) pays a fair wage to the operator for his labour and management, and (4) maintains the fertility of the soil. Success in farming usually refers to financial success, and although it may be questioned whether financial gain is the proper yardstick of farm success, it will be the concept used here. The first three criteria of success can be measured and stated in financial terms; the last of the four requirements may be difficult to measure in the same terms.

Common Measures.- There are several measures used in analyzing a farm business, most of them expressing some form of return to labour. The measure chosen depends on the purpose of the analysis and the illustrations to be made. Three of the most common measures are used here.

"Net farm income" is the difference between farm receipts and expenses with change in inventory taken into account and an allowance made for unpaid labour. It is the payment for the capital and the operator's labour and management.

"Labour income" is the net farm income less a deduction for interest on the operator's capital. It is the payment for the operator's labour and management.

"Labour earnings" is the operator's labour income plus the value of farm perquisites. Perquisites include the use of the farm house and products raised on the farm and consumed by the farm family. Labour earnings provide a closer approximation of the real earnings of a farmer.

The method of calculating these three measures of farm success is shown in Table 16. The farm receipts are made up of current farm receipts and increases in inventory. Farm expenses include current expenses, decreases in inventory and capital expenditures. Charges for depreciation are included in changes in inventory. In calculating labour income, interest at the rate of five per cent of the operator's capital is deducted from the net farm income. As an owner of all or part of the capital which he uses in the farm business, the farmer is entitled to charge the business for the use of that capital, just as if he were paying interest for borrowed capital. The amount remaining after the interest charge is deducted is the return to the operator for his labour and management.

In addition to labour income the farmer receives the use of the farm house and the farm produce consumed in the home. The value of these perquisites varies with the kind of house, the convenience and comfort it offers, and the quality, quantity and variety of farm products. Valuing the perquisites is difficult and constitutes a

big disadvantage in using the labour earnings measure. Quality of farm produce may vary a great deal from farm to farm; to get around this difficulty the prevailing practice is to value the same kinds of produce on all farms at the same price. Consequently the values of farm produce consumed in the home are much the same except where families vary in size and there is a corresponding difference in the amount of farm produce consumed. The use of the farm house is calculated at 12 per cent of the present value of the house.

The average labour earnings of the 78 farms visited was nearly $1,900 and ranged from minus $649 to $6,936. Six of the 78 farms had negative labour earnings; nearly 60 per cent of the farms had labour earnings between zero and $2,000. One fourth of the farms had labour earnings between $2,000 and $4,000 and ten per cent had labour earnings of more than $4,000. According to types of tenure, the part-owners had average labour earnings of $2,694, renters $2,136 and owners $1,538.

Table 16.- Net Farm Income, Labour Incomes, and Labour Earnings According to Size of Farm, 78 Farms, Birtle-Shoal Lake Area, 1949-50

	Number of quarter-sections			
	One and two	Three and four	Five and more	All farms
	- average dollars per farm -			
Total farm receipts	3,991	7,482	11,647	6,859
Total farm expenses	2,863	5,246	7,784	4,758
Net farm income	1,128	2,236	3,863	2,101
Minus interest on average capital	474	868	1,324	778
Labour income	654	1,368	2,539	1,323
Plus perquisites	446	632	726	573
Labour earnings	1,100	2,000	3,265	1,896
Number of farms	33	29	16	78

Living Expenses

Farm living requirements comprise the shelter provided by the farm house and farm-produced products, including fuel, garden and livestock products, and goods and services purchased for cash. The average cash living costs were nearly $1,250 per farm, ranging from an average of $1,015 per farm on the one and two quarter-section farms to an average of $1,783 per farm on farms of five or more quarters. Food, fuel, and light usually make up the largest amount of the cash living costs (Table 17). Part of the cost of operating a car was charged to living expenses.

The variation in cash living expenses is much greater than the

variation in the value of the perquisites. The total value of the perquisites does not vary a great deal from farm to farm and most of the variation is due to the higher value of farm houses. The value of the perquisites is shown in Table 14.

Table 17.- Average Farm Family Cash Living Costs, Birtle-Shoal Lake Area, 1949-50

Item	Average amount per farm	
	Dollars	Per cent of total living expenses
Groceries	421	33.8
Fuel, light	48	3.8
Household furnishings	70	5.6
Clothing	195	15.6
Life insurance premiums	41	3.3
Health	71	5.7
Church and charity	33	2.7
Education	10	0.8
Personal	250	20.1
Auto (operating costs chargeable to living expenses)	107	8.6
Total	1,246	100.0

FACTORS AFFECTING FARM SUCCESS

Farm success is dependent on several factors. The previous analysis has shown that there is a close relationship between farm returns and size of business. Yields from crops and production from livestock also influence farm success. In addition, farm success is dependent on how efficiently resources are used; in the main, resources refer here to capital resources and labour. In this section the factors influencing farm success will be studied and the measure of farm success will be operator's labour earnings.

Size of Business

When size of business is discussed the term refers to the total value of the farm production or the producing capacity of the farm. Size of business is determined by the area of cropland and the number of livestock handled, and the relative value of the types of crop and livestock products produced. In comparing the earnings of different farms with respect to size of farm a measure suitable to the type of farm is required. On grain farms the number of acres of cropland is a suitable measure. On livestock farms the number of cows or animal units may be a better measure. In mixed farming areas where crops and livestock are both important a measure such as productive man work

units 1/ may be more useful. In this study to show the relationship of size of business to earnings the man work unit measure is used.

Table 18 illustrates the relationship between different sizes of farm businesses, when measured by man-work units, and the operator's labour earnings; it shows that as the size of the farm business increased the operator's labour earnings increased. This relationship exists because of the general characteristics of large farm businesses. On a large farm business there is the opportunity to obtain a large gross return if yields are maintained fairly well, and the increase in gross returns is generally accompanied by considerably lower proportionate overhead costs. Increases in farm returns are to be expected when prices of farm products are high and when yields are maintained. However, when prices of farm products are falling and costs are not falling at the same time, deficits rather than surpluses may occur, and these may be greater on the large size businesses.

Table 18.- Relation of Size of Business, Measured by Man Work Units, and Labour Earnings, 78 Farms, Birtle-Shoal Lake Area, 1949-50

Size of business (man work units)	Number of farms	Average P.M.W.U's a/	Average acres of cropland	Average productive animal units	Average operator's labour earnings
					- dollars -
175 and less	29	123	126	7.4	899
176-275	27	222	237	13.5	1,900
276 and more	22	373	345	24.3	3,204
All sizes	78	228	226	14.2	1,896

a/ Productive man work units.

While it has been indicated that returns have risen with increased size of business it should not be assumed that a continuous increase in size will give continued and proportionate increases in returns. The upper limit to the maximum size of a farm depends a great deal on the ability of the operator to supervise all operations, and the upper limit is usually reached at a point where inability to manage effectively results in relatively poor yields. This usually means a farm that will employ two to four men during the year or the equivalent of two all-year-round paid employees. Not many of the farms of the survey employed a labour force of this size.

Crop Yields

There is a direct relationship between crop yields and earnings; usually the higher the yield the greater the earnings. The relationship between yields and labour earnings on farms of the same general size is

1/ The number of productive man work units on a farm represents the number of ten hour days spent on productive farm work during a year.

shown in Table 19. The yields are expressed in terms of crop indexes. An index of 100 refers to an average yield for the crop in the area and in this study is based on three crops, wheat, oats, and barley. The index for any farm is weighted for these crops in proportion to the average yields and acreages of these crops for the area. An index of 100 indicates an average yield of all crops; an index of 125 indicates a yield of 25 per cent above average.

Table 19.- Relation of Size of Farm and Yield to Labour Earnings, 78 Farms, Birtle-Shoal Lake Area, 1949-50

Size of farm and yield	Number of farms	Acres of cropland	Productive animal units	Crop yield index	Operator's labour earnings
					- dollars -
225 and less cropland acres					
Yield index - below 90	18	125	10.8	74	960
- 90 - 110	12	127	11.5	99	1,083
- over 110	13	141	11.8	123	1,850
- All indexes	43	312	11.3	106	1,263
More than 225 cropland acres					
Yield index - below 90	14	312	16.2	77	1,460
- 90 - 110	11	343	13.6	100	2,365
- over 110	10	390	22.0	130	4,708
- All indexes	35	344	17.8	99	2,673

This analysis has indicated a direct relationship between an increase in yields and returns. But it must not be assumed that obtaining maximum yields will bring maximum returns. Recognition of the fact that the principle of diminishing returns operates in agricultural production leads one to realize that maximum physical yields do not necessarily mean maximum earnings. The farmer must realize that while increased use of given resources, such as fertilizers or rotations, may result in increased yields the increased returns may not cover the added costs of the resources used.

Livestock Production

Rates of production of livestock are usually expressed in terms of the main product from each class of livestock; for example, pounds of butterfat per cow or eggs per hen. Not enough detail is available in this study to consider the relationship between rates of production in the various livestock enterprises, but because of the importance of the livestock enterprise on many of the farms, an attempt is made to show the net contribution of livestock to the income of the farm.

Table 20.- Returns from the Livestock Enterprise According to Size of Farm, and Size of Cattle Enterprise, 78 Farms, Birtle-Shoal Lake Area, 1949-50

	Number of quarter-sections						
	One and two		Three and four		Five and more		
	Animal units of cattle						
	8 and less	9 and more	15 and less	16 and more	15 and less	16 and more	All farms
	- average dollars per farm -						
Total livestock receipts	608	2,066	1,611	2,439	1,668	3,735	1,829
Total expenditures	87	398	180	205	281	240	229
Net returns from livestock enterprise	521	1,668	1,431	2,234	1,387	3,495	1,600
Labour earnings	813	1,362	1,721	2,473	2,983	3,700	1,896
Average acres of cropland	104	129	244	279	388	403	226
Average productive animal units	4.5	15.3	11.0	25.0	9.9	29.3	14.2

In the survey area cattle made up nearly 90 per cent of the productive animal units; they accounted for 85 per cent of the sales of all livestock, 79 per cent of all livestock products sold, and 60 per cent of the perquisites from livestock. Although a few farms sold substantial quantities of cream and milk the cattle enterprises were managed, for the most part, as beef cattle enterprises. The relatively large amounts of unimproved land provide grazing in the summer and the cattle are sold off the grass in the fall or fed throughout the winter and sold as grain fed cattle.

The data in Table 20 illustrates the relationship between size of the cattle enterprise and the returns from it and the effect on labour earnings. The total livestock receipts include sales of livestock and livestock products, inventory increases, and the value of livestock products consumed by the farm family. Costs of purchased feeds and other expenses, and decreases in the livestock inventories are included in the expenditures on livestock. The net return from the livestock enterprise is in the form of a return to capital and operator's labour. The capital used by the livestock enterprise would be the land used for pasture and feed, buildings, and equipment used for the livestock.

If a livestock enterprise is to make any significant contribution to farm income it must be of reasonable size. On farms having about the same acreage of cropland, those with above average size cattle enterprises added quite significant amounts to the average labour earnings (Table 20). Cattle managed on an extensive scale require large acreages if a large enterprise is to be kept. The larger enterprises offer greater possibility for more efficient use of labour and

mechanization in livestock production. On farms where the cattle enterprise was limited in size by the amount of pasture available, returns were increased by shipping cream or milk.

Cattle enterprises were dominant on most farms but hog and poultry enterprises were also important on some farms. The selection of the livestock enterprise is influenced by the way it fits in with crop enterprises, the amount of pasture and crop by-products available, buildings on the farm, available markets, labour available and the skills and preferences of the operator and the family labour. Once the enterprise is selected, returns from it will depend on how well it is managed with regard to feeding, and selection and maintenance of high quality herds and flocks. Building investments should be kept to a minimum that will provide good sanitary shelter and allow labour to be used efficiently.

Labour Efficiency

The real cost of farm labour is not the outlays required for hired labour, but the cost of maintaining the farm family, which represents a sizeable amount for the ordinary farm. The major consideration, then, in the efficient use of labour is that of obtaining a high output from family farm labour. To attain efficient use of labour, a primary requirement is that the size of the farm business be sufficiently large for the full use of the available family labour in seasons of peak labour requirements. The use of practical types of modern power and labour-saving devices increases labour efficiency by increasing the area of land and the size of livestock enterprises handled. Effective planning of work to give more timely and better field operations is particularly important in attaining efficient labour use in crop production.

In this study an attempt is made to appraise the efficiency of labour and this efficiency is measured in different ways (Table 21). The amount of labour used on a farm is measured in terms of "man-equivalents". A "man-equivalent" is defined as the equivalent of one year of one man's labour. The efficiency of labour is measured by the amount of work done by one man-equivalent, and can be expressed in acres of cropland and animal units handled per man. Another measure, productive man-work units per man, which combines work done on crops and livestock, is also used. In general as the size of the farm increased the acres of cropland handled per man also increased. The larger farms had more labour per farm and had more work done per man equivalent than the smaller farms. When the amount of work accomplished is measured by productive man-work units per man, the amount of work done per man within each size of farm group is higher on the farms that have cattle enterprises larger than average size.

The efficiency of labour use in crop production becomes less variable as mechanization of crop production increases, and then the aspect of labour use in mechanized crop production which becomes important is that concerned with decisions regarding selection of crops and cultural practices and the timing of field operations. On the farms of the survey area, the labour expended on productive activities

was for the most part concerned with production of cereal crops and caring for livestock; the labour required for these enterprises was for the most part non-competing. There was more labour on farms where the cattle enterprises were larger than average size. But the labour force on the farms with larger than average cattle herds did not have significantly more family labour.

Table 21.- Labour Efficiency in Relation to Size of Farm and Size of Cattle Enterprise, 78 Farms, Birtle-Shoal Lake Area, 1949-50

Number of quarter-sections and animal units of cattle	No. of farms	M.E.'s per farm a/	Cropland acres per M.E.	P.A.U.'s per M.E. b/	P.M.W.U.'s per M.E. c/	Average operator's labour earnings
	- number -		- acres - averages per farm -		- number -	- dollars -
One and two quarters						
8 and less A.U.'s	16	1.08	96	4.2	813	93
9 and more A.U.'s	17	1.19	108	12.9	1,362	156
Three and four quarters						
15 and less A.U.'s	17	1.39	176	7.9	1,721	148
16 and more A.U.'s	12	1.67	167	15.0	2,473	207
Five and more quarters						
15 and less A.U.'s	9	1.64	237	6.0	2,983	157
16 and more A.U.'s	7	2.24	180	13.1	3,700	194

a/ Man equivalents.
b/ Productive animal units.
c/ Productive man work units.

The quality of labour is probably more important in livestock than in crop production and generally where well planned work procedures have more effect in increasing labour efficiency. Although measurement of labour efficiency on the farms visited can only be in the nature of an estimate, for the most part it is unlikely that labour employed on livestock production in periods when crop production processes are stopped, that is, in the winter, is employed to anything approaching full capacity. The measures of acres per man and animal units per man only indicate that more work is accomplished on larger farms, and that returns are larger where more work is accomplished per worker. No measurement of the actual extent to which the workers are fully employed or differences in output, resulting from better work methods or mechanization, has been attempted.

Capital Efficiency

When reference is made to efficiency in the use of farm capital, farm capital usually means the investment in land, buildings, machinery, equipment, livestock, feeds, seed, and other supplies. In selecting the capital used in his farm the farm operator is concerned with obtaining a proper balance between the investment in the various items of capital in order to have sufficient capital in each form, and with using it at a level of efficiency such that his costs per unit of production are at a minimum.

The question of efficiency in use of capital then becomes one of obtaining a low cost from the particular form of capital in relation to output. It does not imply the lowest possible costs. Insofar as the achievement of low costs of equipment and other capital affects the farmer's earnings, achieving low costs is an alternative aspect of increasing net returns. It attempts to reduce the costs of obtaining the output rather than attempting to increase the output. Costs involved in obtaining output are of two types - direct and overhead. The direct costs include principally the materials used in production; for example, seed, gas, oil, feed and fertilizer. The savings that can be made in these costs are generally small because these costs usually increase in proportion to increases in output. Usually greater opportunity for reducing costs lies in the field of overhead costs, which include the relatively fixed costs of machinery and real estate. Because of the fixed amounts of investment, overhead costs represent a greater or lesser cost depending on the total output attained. The importance of the overhead costs is apparent when it is realized that these costs may represent up to one half or more of the total costs.

Power and Machinery Costs.- The capital costs of machinery include repair and upkeep, depreciation, and interest. Repair and upkeep costs are usually quite apparent as they occur quite regularly as the machine is used. Depreciation costs are less easily recognized, because annual depreciation charges are not usually set aside, with the result that the depreciation costs become apparent at the time of replacement. The interest cost is less apparent, and is usually only considered when the operator is using borrowed capital. When the capital is owned the cost of interest is often overlooked.

In the survey area most of the farms used tractors for field work although horses were used as supplementary power and for threshing and winter transportation. On some of the farms horses were not fully utilized and consideration could be given to disposition of some of the horses to attain some reduction in power costs. Where tractors provide the power the primary requirements are that a large acreage be handled per tractor. Low cost tractor power is dependent on 600 or more hours of operation per tractor. The average number of hours of tractor operation on 56 of the farms included in the survey was 682. The range in hours of operation was from 200 to 1,200 hours. Acres handled per tractor ranged from 90 acres, for a farmer with a two-plow tractor, to 550 acres on a farm with a four or five-plow tractor. Farms with two-plow tractors averaged 520 hours of tractor operation on an average of 131 acres of cropland, which was nearly four hours of tractor operation

per acre of cropland. Farms with four or five-plow tractors averaged 771 hours of tractor operation on an average of 314 acres of cropland, or nearly 2.5 hours of tractor operation per acre.

Efficiency in the use of equipment requires balancing the size of the machine with the size of the power unit and the size of the farm. In selecting specific machines there is need to avoid duplicating machines that do essentially the same kind of work. Where sufficient work cannot be provided on a farm to warrant purchase of a machine, consideration should be given to the use of rented machines or hiring the work done. Or, the use of a machine may be extended by doing custom work.

A present trend in mechanization of many farms, once sufficient tractor power and field equipment is acquired, is to purchase equipment that is commonly referred to as "labour-saving". In this category are included grain loaders, farm-hand attachments for tractors, and electrical motors and motor-driven equipment. Where labour is not available or is high priced, investment in machines of this type can be highly profitable and effective in reducing the drudgery and hard work of choring on mixed farms. In considering the use of this equipment the decisions regarding its acquisition should be based on whether or not the annual savings in labour are greater than the annual cost of the equipment. To be effective the labour saved must be actual savings of hired labour, or if it is family labour, it must be possible to employ it profitably in other ways.

Table 22.- Machinery Operating Costs According to Size of Farm, 78 Farms, Birtle-Shoal Lake Area, 1949-50

	Number of quarter-sections			
	One and two	Three and four	Five and more	All farms
	- average dollars per farm -			
Credits				
Increase in machinery inventory	551	984	1,720	952
Machinery sales	102	347	410	256
Custom work	38	86	44	57
Total credits	691	1,417	2,174	1,265
Outlays for machinery				
Decrease in machinery inventory	43	70	92	63
Capital expenditure for machinery	828	1,797	2,795	1,592
Operating costs of special machinery	384	708	1,091	650
Machinery repairs	57	79	114	77
Custom work	68	69	68	68
Interest on average inventory	111	232	317	198
Total outlay	1,491	2,955	4,477	2,648
Net machinery costs	800	1,539	2,303	1,383
Total cropland acres	117	258	394	226
Costs per acre of cropland	6.84	5.94	5.85	6.12
Number of farms	33	29	16	78

Table 22 presents the results of calculations of the net machinery cost per acre of cropland. Charges are made for decreases of inventory, purchases of machinery, operating costs, custom work hired, and interest on the average investment. Depreciation costs are included in the decreases in inventory. The machinery account is credited with increases in inventory, receipts from custom work and sale of equipment. The difference between the credits and charges is the net cost of power and machinery operations.

There was some tendency for the net machinery costs per acre of cropland to decrease as the size of farm increased. Costs ranged from $1.30 to $18.97 per acre of cropland, but nearly 60 per cent of the farms had costs ranging from $5.00 to $8.00 per acre of cropland, the remainder being about equally divided above or below this range. The direct costs for repairs and operating special equipment averaged $3.22 per acre of cropland for all farms, which is a little more than half of the total cost per acre.

Building Investment and Use.- Efficiency in use of buildings implies low cost of investment in relation to the purposes served. The average investment in buildings was $3,918 per farm or $8.06 per acre. Of the farm buildings other than the house the largest proportion was for livestock shelter. The investment in livestock buildings averaged about $84 per productive animal unit on all farms. On farms of four quarter-sections or less those with less than average amounts of livestock had about half the investment in buildings for livestock, but the investment per productive animal unit was much higher on the farms with smaller livestock enterprises. On farms of more than four quarter-sections the investment in livestock buildings was about the same, irrespective of size of the livestock enterprise, but the investment per animal unit was $170 on farms with less than average numbers of livestock and $65 per unit on those with above average livestock numbers.

Use of the Land.- Efficiency of capital in relation to land implies obtaining the best output from the available land. It means having all tillable land under cultivation, selecting crops in relation to suitability of soils and topography, and adapting crops and crop sequences in the rotation in relation to yielding power. It also means making full use of unimproved pasture and hayland. Longer time efficiency in the use of land is related to the method of attaining low-cost maintenance of fertility.

In the survey area efficiency in use of land is closely related to the amount of cropland used for wheat, oats, barley and summerfallow. While wheat is the main cash crop and usually yields well on summerfallow, oats and barley have important places in the rotation, providing feed grains and some grain for sale. Oats and barley also use cropland more effectively than wheat in the later stages of the rotation and are effective in weed control. Barley, as a cash crop, has been increasing in recent years. The other major use of cropland is for summerfallow. The main reasons for use of fallow are for weed control and storage of moisture. The requirements for moisture storage in this area are much less than in the drier prairie regions, but weed control has been a

matter of importance. The allocation of cropland becomes, then, a choice of apportioning land between the cereal grains - wheat, oats and barley, and summerfallow.

Table 23.- Relationship of Labour Earnings to Percentage of Cropland in Summerfallow, 78 Farms, Birtle-Shoal Lake Area, 1949-50

Per cent of cropland in summerfallow	Acres of cropland	Average labour earnings	Labour earnings per acre of cropland
30 and less	162	2,214	13.67
31 - 35	251	2,497	9.95
36 - 40	250	1,756	7.02
41 - 45	237	1,811	7.64
46 and more	228	1,487	6.52

Table 23 shows the relationship between the percentage of cropland in summerfallow and labour earnings. There was a tendency for the labour earnings per acre of cropland to decline as the percentage of cropland in summerfallow increased. The farms with less than 30 per cent of the cropland acreage in summerfallow were considerably smaller and the high labour earnings in this group are the result of a few relatively large farms with high earnings being included in this group, with consequent raising of the average labour earnings of the group. Summerfallow was increased primarily to obtain higher yields but it it likely that other practices such as alternative rotations or fertilizer use would give just as good yields without the high costs of summerfallow and having the land in summerfallow. Returns could even be increased on some farms by reducing the acreage in summerfallow.

SUMMARY

The survey area covers about 142,000 acres in west central Manitoba. It is located on the shallow phase of the Newdale association of the Northern Black Earth soil zone.

In 1950 more than one half of the farms were one and two quarter-sections in size, although the area had been settled for nearly 75 years. Eighty-one per cent of the farms were owner-operated.

The average assets of the 78 farms visited were about $20,100, made up of $9,000 real estate, $2,700 in livestock, $4,400 in machinery, $600 in seed and feed and $3,400 in non-farm assets. Liabilities averaged nearly $2,400, making an average net worth of about $17,800.

The average size of the 78 farms visited was 486 acres of which 226 acres, 46.5 per cent, was cropland.

Wheat was the most important single crop, and all grains made up 55 per cent of the total cropland. Forty per cent of the cropland was in

summerfallow in 1949 but the summerfallow acreage in this area has been high for some time.

There was an average of 14.3 productive animal units per farm, and cattle were the most important class of livestock, averaging 12.7 animal units per farm.

There was an average of 1.43 man equivalents per farm with the operator and his family supplying nearly 90 per cent of the farm labour.

The farm capital averaged nearly $16,000 per farm which was $71 per acre of cropland. Real estate, including farm land and buildings, averaged $39 per acre of cropland. Machinery investment was $18 per acre of cropland.

Farm receipts average nearly $4,800 per farm. Wheat and other crops accounted for 64 per cent of the cash farm receipts, and livestock and livestock produce 25 per cent.

Cash expenses averaged $2,006 per farm and expenditures for capital were $2,365 per farm. Costs of maintaining and operating equipment and machinery accounted for 41 per cent of the current expenses, and labour accounted for 25 per cent. Nearly two-thirds of the capital expenditures were for machinery and equipment.

The operator's labour earnings averaged $1,896 per farm and ranged from minus $649 to $6,936. On the small farms the labour earnings were $1,100, on the medium-sized farms, $2,000 and on the large farms $3,265.